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- *Dust-correlated centimetre-wave radiation from the M 78 reflection nebula.*  
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- *Infrared spectra of hexa-peri-hexabenzocoronene cations:  $HBC^+$  and  $HBC^{2+}$ .*  
Zhen, J.; **Castellanos, P.**; Bouwman, J.; Linnartz, H.; Tielens, A. G. G. M.  
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## *Publications*

- *Laboratory gas-phase spectra of two astronomically relevant PAH cations: Diindenoperylene  $C_{32}H_{16}^+$  and dicoronylene  $C_{48}H_{20}^+$ .*  
Zhen, J.; Candian, A.; **Castellanos, P.**; Bouwman, J.; Linnartz, H.; Tielens, A. G. G. M.  
2018, *Astrophys. J.*, Vol. 854, Art. 27
- *Photoinduced PAH dehydrogenation: The competition between H- and H<sub>2</sub>-loss.*  
**Castellanos, P.**; Candian, A.; Zhen, J.; Linnartz, H.; Tielens, A. G. G. M.  
2018, *Astron. Astrophys.*, *in press*
- *Photoinduced PAH dehydrogenation: Molecular hydrogen formation in dense PDRs.*  
**Castellanos, P.**; Candian, A.; Andrews, H.; Tielens, A. G. G. M.  
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## CURRICULUM VITAE

I was born in La Habana (Havana), Cuba on March 1st, 1987 to a Chilean mother and a Cuban father. Given the combined circumstances of the end of the Chilean dictatorship and the beginning of the Cuban Special Period following the fall of the Soviet Union, together with my mother and younger brother I moved to Santiago, Chile during the first half of the 90's. The first years in Chile we lived with my grandparents where my grandfather in particular had a hand in steering me towards science in general and astronomy in particular. I went to high school at the Instituto Nacional José Miguel Carrera, where the effort and encouragement of my family paid off and I was able to enroll in the the bachelor programme of Science with mention in Astronomy at Universidad de Chile. During the last few years of the bachelor, I worked together with Prof. dr. Simón Casassus on the continuum emission at 30 GHz; the anomalous microwave emission (AME). That was the first real encounter with research and what it entails, using radio observations from the Cosmic Background Imager (CBI) and mid-infrared data from *Spitzer* and *IRAS* in order to test for the hypothesis of the AME being due to very small, rapidly rotating dust grains. This work resulted on my first publication and my involvement on a separate project on the same topic, led by Dr. Matías Vidal, then a master student.

Afterwards, I applied and got enrolled in the Research Master in Astronomy at Leiden University, where I was able to study thanks to the Oort scholarship. I quickly forged friendships that last to this day and got involved in astrochemistry research, together with the work on the courses. I did my minor research project with Prof. dr. Michiel Hogerheijde, looking for emission lines of methanol in the disk of TW Hya using spectra observed with the James Clerk Maxwell Telescope and modeling the line emission using the Line Modeling Engine code (LIME). The major project was done under the supervision of Prof. dr. Alexander Tielens and it involved the search for the then recently detected  $C_{60}$  in photodissociation regions, using *Spitzer* mid-infrared spectral maps.

As a result of the work done during the Master programme I was offered a position for the PhD programme in Astronomy by Prof. Tielens, with partial funding from a Huygens fellowship. Here I worked on expanding the work done for the major research project into a fully fledged article which is included in this thesis. Even though I lacked the experience, I was interested in the experimental research done in the Laboratory for Astrophysics during the master and the possibility opened up for doing such work for my PhD. I was received there by Prof. dr. Harold Linnartz, who would also

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become my promotor, and by Dr. Junfeng Zhen. I started working with the instrument for photodynamics of PAHs (i-PoP) and, especially in the first year, I had to get myself up to speed on hands on laboratory work and on the topic of ion traps and mass spectrometry in particular. I was involved in several studies on the photodissociation of PAHs, including work done at the synchrotron facility SOLEIL in Paris, France.

Nearly every year during the PhD I have been involved in experimental work at the free electron laser for infrared experiments, FELIX, at Radboud University in Nijmegen. There the work has evolved from the first couplings of i-PoP with FELIX when studies of known systems were performed, to recording the IR spectrum of large PAHs and measurements of the spectrum of fragmentation products. These studies have involved close collaboration with Dr. Alessandra Candian in order to interpret the experimental results on the basis of density functional theory (DFT) calculations. I also spent a few months in Lyon, France, working together with Prof. dr. Franck Lépine and his group on femtosecond photodissociation dynamics of PAHs.

The research has involved a strong component of computational modeling. As part of the study on PAH dehydrogenation I have developed a comprehensive Monte-Carlo simulation code, which includes hydrogen roaming as well as multiple fragmentation channels, all based upon DFT calculation by Dr. Candian. Additionally, I have implemented modifications into the code for PAH fragmentation in PDRs created by Dr. Heather Andrews, in order to include the effect of PAH isomerization in an astronomical context.

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Properly acknowledging everyone who has, in one way or another, contributed to this thesis would make this book twice as long, but probably a far easier read. Considering this, I will try and summarize as much as possible what I am grateful for, and include by name those involved in it. If there are omissions (and there will be) please forgive me and know that it is not out of disregard; even nothing but a list of names would be a long undertaking and most of you know how bad I am at retaining names.

In the first place, I would like to thank Simón Casassus, with whom I worked in Chile, and who trusted me during the bachelor in such a way that made this PhD a possibility. I am very grateful to Alessandra as well, without her patience and dedication I doubt this thesis would have ever become a reality. Also to Junfeng, who eased me into transitioning from purely observational astronomy into hands-on laboratory work. With Jordy I had less time to work with, but the long conversations and discussions at coffee breaks that ended up in de Gouwe and the dinners with Wendy and Zoey were just perfect. I would like to thank as well all my colleagues at the Laboratory for Astrophysics and the ISM group, for sharing in with paper cakes, pizza meetings, day outs and many other occasions: Aart, Ainil, Cameron, Daniel, Danna, Dario, Gleb, Gwen, Héctor, Jeroen, Jerry, Kim, Kirstin, Ko-Ju, Martijn, Michał, Niels, Vincent, Xavier and others who have passed through both groups. Also the people whom I met all over the Netherlands and in plenty of different circumstances, not necessarily as part of the observatory, but who have been with me at some point: Anne, Daniel, Emanuele, Iva, Kaveh, Madusha, Marco, Mher, Nikita (большое спасибо за уроки!), Sayan, Sumit, Swasti, Vincent and Ylva.

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